2025 3rd International Conference on Advancements in Electrical, Electronics, Communication, Computing and Automation (ICAECA) | 979-8-3315-2543-9/25/$31.00 ©2025 IEEE | DOI: 10.1109/ICAECA63854.2025.11012406

DETECTION AND TRACKING OF DRUG TRAFFICKING IN ENCRYPTED SOCIAL MEDIA

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***Abstract*—Social media platforms are now crucial for the promotion and distribution of illegal drugs. Hashtags increase the likelihood of drug usage by making it simpler for users to participate in drug trafficking. Nonetheless, identifying and controlling drug trafficking activities presents considerable difficulties. Furthermore, the quick legalization of some substances has necessitated a more precise classification of drugs in order to differentiate them from illegal ones. Inspired by these findings, our goal in this study is to create a methodology that uses the most recent developments in artificial intelligence technology to categorize hashtags from postings that advertise illegal narcotics for sale on social media. We offer a semi-supervised deep learning method for categorizing hashtags from posts that promote illegal substances.**

***Index Terms*—Drug trafficking, online drug trade, detection systems, social media analysis, natural language processing (NLP), automated tracking, discovery anomalies.**

I. INTRODUCTION

The goal of this research is to exploit social media sites like Instagram to identify and monitor online drug trafficking. The online drug trade has grown to be a significant problem, with opioids and stimulants accounting for over 100,000 drug overdose deaths in the United States in 2021. Hashtags are frequently used by traffickers to advertise illegal drugs . To better detect and monitor illegal activities, this study presents a way to categorize drug-related Instagram hashtags. With an accuracy of about 75 percent, the system provides a more effective way to keep an eye on drug trafficking online.

979-8-3315-2543-9/25/31.002025$IEEE$

II. BACK GROUND

Encrypted social media platforms have revolutionized communication in the digital age, but they also pose challenges for law enforcement in combating criminal activities, particularly drug trafficking. These platforms' anonymity and secrecy allow drug traffickers to operate with advanced techniques like emojis, pictures, and coded language. Researchers and law enforcement organizations are developing advanced methods to identify and monitor drug trafficking on these platforms[13]. Machine learning algorithms, natural language processing, and picture recognition technologies can help law enforcement focus on specific words and visual indicators related to drug trafficking. Collaboration between social media companies and law enforcement organizations is also essential to create legal frameworks that balance security and privacy.

III. LITERATURE SURVEY

A. Internet trafficking and encrypted social networks

Communication has been transformed by encrypted social media platforms like Signal, Telegram, and WhatsApp because of their high degree of security and privacy. However, these platforms also pose difficulties for law enforcement, especially drug traffickers who rely on them for their activities. Emojis, images, coded language, and private groups are some of the tools these traffickers use to avoid detection. Law enforcement is creating new strategies and tools to combat this, such as machine learning algorithms, image recognition, and natural

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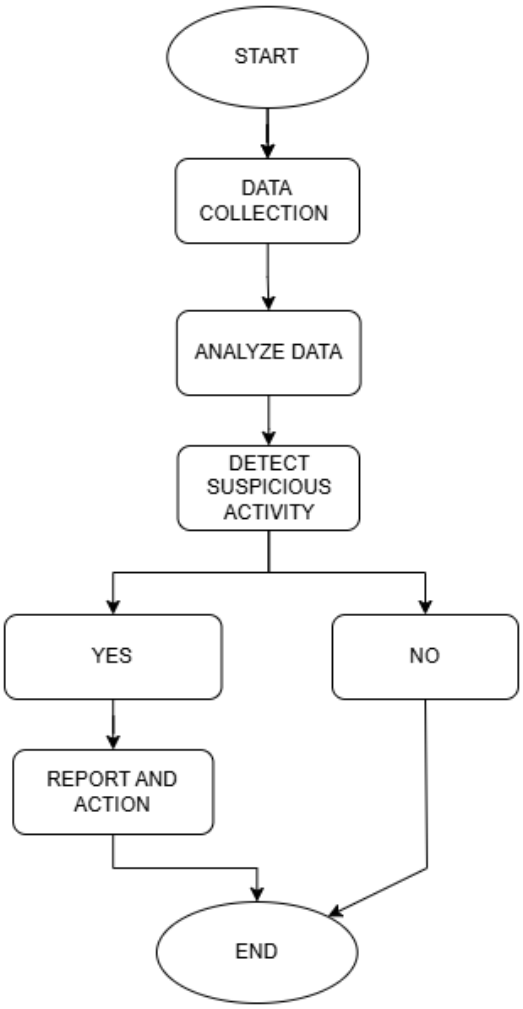

Fig. 1. Flow Chart

language processing [7]. Working together with social media companies and developing legal frameworks that strike a balance between privacy and security issues are necessary for this. This study examines the difficulties and cutting-edge techniques for spotting and keeping an eye on drug trafficking in this ever-changing online landscape.

B. Detection with ML and AI

Artificial intelligence and machine learning have revolutionized the detection and tracking of drug trafficking operations on encrypted social media platforms. Machine learning can analyze large data volumes, identify suspicious activity, and alert authorities to potential illicit activities. Natural language processing (NLP) is crucial for interpreting the coded language used by traffickers and detecting contextually relevant information and hidden meanings. Image recognition technology is also crucial in identifying packaging, secret messages, logos, and other images connected to drugs. These technologies offer a comprehensive approach to identifying and following drug trafficking on encrypted platforms, making them increasingly important in the fight against drug trafficking and public safety.

C. Social Media and Hashtags in Drug Trafficking

According to a study by Martín et al. (2020), hashtags on social media sites like Facebook, Instagram, and Twitter facilitate the dissemination of content connected to drugs, which helps traffickers sell illegal substances. According to their research, hashtags serve as online entry points that make it easier for users to locate articles about drugs and get in touch with vendors[1]. The report also pointed out that the rising use of encrypted communications makes monitoring more difficult and necessitates the use of more sophisticated detecting tools.

D. Monitoring Social Media for Illegal Content

Several attempts have been made to create automated solutions for social media content monitoring [Fig.1] The use of machine learning algorithms to identify dangerous content on social media sites like Twitter was covered by Binnsetal(2018). In order to detect and classify different types of illicit content, such as those pertaining to drugs, their study used supervised learning algorithms. The dependence of their model on manually labeled data, which requires ongoing maintenance and improvement, was also a drawback.

E. Challenges in drug-related content and its classification

. The dynamic nature of online drug slang and the frequent usage of coded language present a significant barrier in the automatic classification of drug-related content. Civancik et al. (2021) investigated how traffickers circumvent detection by using encryption and cryptic phrases, rendering conventional keyword-based filtering useless[5]. They therefore proposed that deep learning techniques, which are more adept at comprehending language's context and semantics, are more appropriate for these kinds of tasks. article array

PARAMETER	DESCRIPTION
Platform	Encrypted apps like Telegram
Detection Method	AI-based analysis of text, images
Suspicious Keywords	Monitoring codewords, slang, emojis of drugs
User Network Analysis	Detect connections between suspicious users
Alert Mechanism	Automated alerts to law enforcement

F. Examples and Uses in the Real Life

This section explores actual cases and useful implementation of how different tactics and tools have been used to identify and monitor drug trafficking activity on encrypted social media platforms. Case studies demonstrate how well machine learning algorithms can spot questionable trends in transactions and communications. For example, law enforcement organizations have effectively decoded traffickers' coded jargon and slang using natural language processing. Technologies for picture recognition have also proved essential in examining visual information for hidden messages or imagery

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connected to drugs. When integrated, these technologies offer a thorough strategy for illegal activity.

IV. METHODOLOGY

A. Obtaining and Tracking Data

Monitoring questionable activity on encrypted social media sites like Instagram, WhatsApp, and Telegram is essential for spotting drug trafficking. This entails developing and implementing automated bots that are able to listen for and search for particular hashtags and phrases related to drug trafficking. These automated systems are designed to examine enormous volumes of data in real-time, spotting patterns and trends that can point to illegal activity[15]. The bots are able to mark messages, photos, and discussions for additional scrutiny by concentrating on public forums, private groups, and communication channels.

B. Identification of the User

Law enforcement agencies use metadata and device fingerprinting techniques to identify people engaged in questionable activity on encrypted social media sites. Important details regarding the context and source of messages are provided by metadata, including timestamps, IP addresses, and geographical data[Fig.2]. Authorities can monitor user movements and activity by examining metadata without having direct access to the encrypted information. Gathering details about the hardware and software setups of the device, including the operating system, installed plugins, and browser type, is known as device fingerprinting[4].

C. Keyword Hashtag Monitoring

Keep tabs on particular drug-related terms, hashtags, and slang that are used in encrypted chats.

D. Cooperation with the Authorities

To combat drug trafficking in encrypted social networks, ks, strong cooperation with law enforcement is crucial [3]. This involves implementing information-sharing procedures, standardized reporting, capacity building, and training[16]. This alliance promotes a comprehensive strategy that combines technical breakthroughs with legal and regulatory measures.

V. METHODOLOGY

A. Dashboards and Reports

A dashboard is needed to visualize data, monitor investigations, and analyze trafficking trends on encrypted social media platforms. It should combine data from multiple sources, provide real-time updates, editable reports, and interactive visualizations [2]. This will help law enforcement disrupt drug trafficking networks and maintain public safety.

VI. IMPLEMENTATION

A. Creating An Application

Creating a user-friendly Application that is used for people interaction likewise a social media(Facebook, Telegram). With the help of the application we can build a healthy relationship but if people misuse it like selling and buying drugs they will be caught and punished.to overcome the addiction and death of the people's lives[7].

B. Detecting suspicious activities

Nowadays people are consuming drugs as well as becoming addicted to them. To overcome the problem, we created an application that can identify user details such as (IP address, e-mail, and phone number) [6]. If the user of the application uses words like drugs, the admin can identify and track the details of the particular user. most of the drugs such as cannabis, marijuana, and heroin[Fig.5].

C. Drug Keywords

The drug consumer can not directly interact with other users with the word drug instead they use some other word related to them. As of the research, we found some keywords related to the drug (Mescaline) These are the keywords used to sell drugs in their interaction[Fig 2].

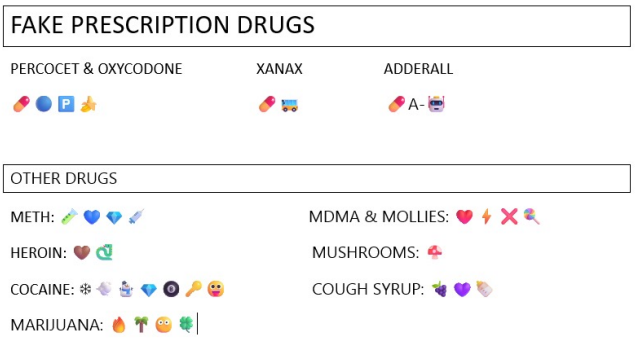

Fig. 2. Drug Keyword

D. Collection of data

Collecting the data of the users in the particular created application. if they use keywords like (Mescaline) we can identify the user's details like(IP address, E-mail, and Phone number). after collecting the data it will allow us to analyze the data[Fig.3].

E. Report and Action

After the analyze the data the Admin will give a Warning to the user. if they are using it continuously they will report them to higher authorities.

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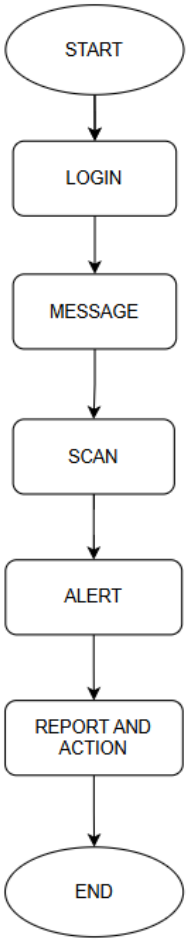

Fig. 3. website flow

VII. SYSTEM ARCHITECTURE

A. Web Development

1) User and Login page: Users and administrators can log in using a secure authentication mechanism that has been designed [4]. Users are taken to the main page, which looks like a social media platform, after logging in. Users can send friend requests to each other[6]. Once you can connect you can message whenever you needed. You can exchange messages within the platform[Fig.4].

B. Drug related contents

Users can easily message through the messaging feature.if the user can type a drug-related keyword, slang, or emoji, the system automatically detects it [2]. Put in place mechanisms for message and metadata analysis and decryption. To find patterns, apply statistical and natural language processing (NLP) methods. The technology can detect questionable actions and possible dangers by decrypting data and interpreting content. Effective monitoring and analysis are made possible by this method, which guarantees the extraction of important information from encrypted data.

C. NLP keyword Detection

A defined dataset of drug-related works, hashtags, and emojis is integrated, and using NLP-based models analyze message content for potential illicit conservation.

D. Admin panel

1) Alerting Dashboard: when the user uses a word related to the drugs then we can easily alter it and Admin has access to the dashboard displaying flagged conversion. The System provides details like the sender's IP, email, and chatlog [2]. It will be Analyzing Texts, Process Images, Analysis of Behavior[Table 1].

E. Data Intake

Use message queuing platforms like Kafka, web scraping, and APIs to put data collection methods into place. Both large-scale and real-time data streams can be effectively managed and processed with these techniques. By using these techniques, enormous volumes of data may be accurately and swiftly absorbed, laying a solid basis for further analysis and detection initiatives. This method is crucial for preserving the timeliness and integrity of the processed data [3].

F. Processing Images

This method finds illegal drugs or paraphernalia in photos posted on social media or messaging apps by using sophisticated image recognition algorithms. Even if a picture is partially hidden or masked [4], the system can recognize and flag it as containing drugs or items associated to drugs by analyzing visual data. This feature facilitates the detection of trafficking activities that use visual communication [5].

G. Analysis of Behavior

This method looks at user behavior to identify any irregularities that might point to illegal activity. The system may detect strange behaviors that diverge from typical usage patterns by examining interaction patterns, [9] message frequency, and other behavioral data. Such irregularities may point to questionable activity and require additional research.

Fig. 4. Drug Signals

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VIII. DISCUSSION

Identification and tracking of drug trafficking on encrypted social media platforms are a serious problem that requires cutting-edge tools and creative solutions. Traffickers frequently carry out their operations covertly by using encrypted photos, videos, and texts. To counter this, authorities and organizations use digital forensics, machine learning, and natural language processing to find suspect behaviors, trends, and keywords that point to drug-related activity[10]. To quickly detect and stop illegal transactions, real-time monitoring and analysis are essential[16]. Law enforcement organizations can improve their capacity to monitor and dismantle drug trafficking networks by utilizing this technology, eventually bolstering public safety endeavors.

IX. CONCLUSION

The project uses artificial intelligence, NLP, and deep learning to detect and track drug trafficking on encrypted social networks. Classifies messages, monitors activity in real time, and alerts law enforcement. Future enhancements include multi-platform integration and adaptive learning to counter evolving encryption techniques. By employing these methods, authorities can effectively monitor and disrupt drug trafficking networks, ensuring timely intervention and enhancing public safety. Continual updates and retraining of models with new data and feedback ensure that the systems remain effective and adaptive to evolving patterns. This comprehensive strategy is essential in the ongoing fight against drug trafficking on digital platforms [12].

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